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Joplin Mineral Museum Friends, Inc.
Schifferdecker Park
Joplin, Missouri 64801
(417) 623-2341

14 August 1989

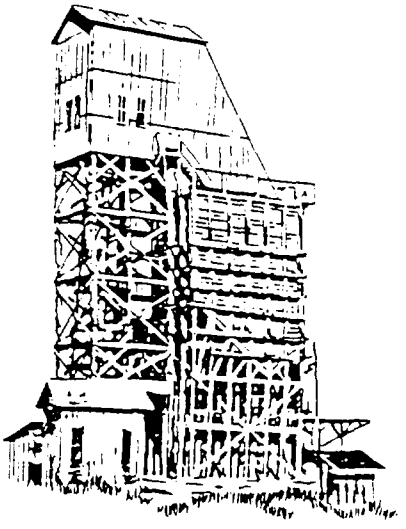
Mr. Glenn Curtis,
U.S. ENVIRONMENTAL PROTECTION AGENCY,
Superfund Branch,
726 Minnesota Avenue,
Kansas City, Kansas 66101

Dear Mr. Curtis:

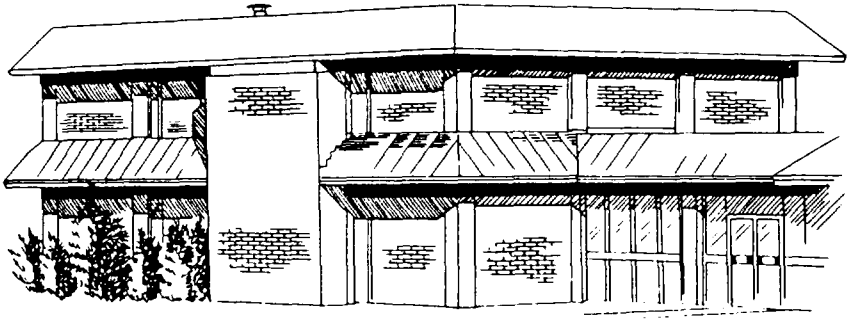
The Joplin Globe of 4 August 1989 carried an article that said that you were interested in receiving written comments about the mine pollution in the Joplin- and Tri-State area. The Fall 1988 issue of the Mineral Museum News has as its first article, which I wrote and which is pertinent, some "Thoughts About Mine Pollution". This may be of interest to you.

Sincerely,

Everett J. Ritchie
Chairman



# Mineral Museum News



**FALL 1988** TRI-STATE MINERAL MUSEUM Schifferdecker Park • Joplin, Missouri 64801 • 417-623-2341 **Vol. 2 No. 3**

## THOUGHTS ABOUT MINE POLLUTION

The concern of environmental agencies about the traces of metals in samples of water from some places in the Tri-State implies that prior to mining all of the district's water was of 'ine purity. This can lead to the absurd point of view that mining companies, the miners, and the landowners were in some way to blame for the ore deposits being in the ground. Any ore deposit will add trace amounts of some elements to the water that comes in contact with it. It must be recognized that the political and environmental agencies' desire to spend millions of dollars in the area carries no assurance that the situation will be changed.

Millions of years before mining began, the surface and subsurface rocks of the Tri-State were attacked by rain and ground water resulting in the formation of water courses, caves, and extensive beds of broken and porous ground, known as "open ground", through which water could flow and carry the elements of the ore minerals. Some areas of open ground became the resting place for thousands of tons of ore minerals. Other areas remained completely barren.

Most of the ore minerals were deposited at considerable depth, but surface erosion over large areas removed many feet of top soil and rock, and in effect brought the ore deposits much nearer the surface. Some were actually at the surface. These shallow deposits of primary sulfide ores were easily attacked by air and rain water resulting in the formation of significant amounts of secondary ores, as carbonates, sulfates, and a silicate. The shallow deposits also added metals to the ground water flowing over them.

The Tri-State is still a highly mineralized area. Although about 21 million tons of zinc and lead minerals have been removed by mining, much still remains. The mineral deposits are ost everywhere–in deposits too small or too lean to be ...ied, in columns supporting mine roofs, in many drill holes that showed signs of ore but which were never exploited, and isolated pockets of ore of all sizes. In addition, all sedimentary rocks contain measurable amounts of twenty or thirty elements including our local ore minerals.

Mining has removed most of the shallow ore deposits and this should eventually improve the water quality above what it was before mining began. Mining increases the size of the water courses in the mineralized areas and thus the amount of water that can accumulate in them. It also assists air to enter the openings and oxidize the iron sulfides that result in the acid water that is a solvent for some other minerals. Fortunately most mines have exposed beds of limestone that will neutralize acid water and cause many metals to be precipitated. The mineralized areas in many places were sufficiently porous for air and rain water to enter the ground without any help from mining. This sequence of reactions will go forward without human intervention and at no cost. It is unfortunate that a science-fiction type of "time machine" does not exist. If we had one we could send someone back to about 1800 to get samples of the spring and ground water of that time and bring it back to 1989 for analysis by modern instrumental methods. It is very possible that water considered pure in 1800 would be labelled "unsafe" by today's analytical methods and standards.

The contribution of metals from the residual ore deposits to the water of the Tri-State will decrease with time as the natural chemical and geological processes work towards equilibrium. The water in the Oronogo Circle Pit is a good example of mine water purifying itself. Time is needed for these reactions because the volume of water is so large–but there is not a lot that can be done to speed it up. It is questionable if the metals leaching from tailing piles pose as big a threat to water quality as did the several million tons of near surface ore deposits that were removed by mining.

It makes sense to close old mine shafts, plug unused deep wells, cap drill holes, divert surface water from open pits, and to seek deep well sites that can yield satisfactory water. But as long as we still have millions of tons of ore minerals scattered over the district there will always be trace amounts, or more, of some of the ore elements in the water.

## CONCRETIONS

Some of the limestone beds of the Tri-State contain many concretions. These are usually rounded or nodular masses of chert that differ in structure and composition from the surrounding rock. They vary in size from marbles to beach balls. Many of the chert pebbles in the Ozark streams are nodules or concretions released by the erosion process that weathered away the surrounding limestone.

A hollow rounded concretion in which the inner surface is lined with crystals that point towards the center is called a "geode". Very few of the Tri-State concretions contain crystals, but they often contain a small chert pebble. Many concretions are egg shaped (see figure 1). When the basement of the present Joplin Municipal building at Third Street and Pennsylvania Avenue was being dug, a large number of egg-shaped concretions were uncovered. Considerable excitement prevailed for several days until it was established that they were NOT dinosaur eggs!

There are many questions about the manner and processes by which concretions are formed. Some have a very hard and compact shell, others are much softer and appear to be porous. When broken, some of the hard ones are found to be solid and show several colored rings (see figure 2). Probably many were formed from silica gels that accumulated in cavities and hardened.

Some concretions have shells composed of several layers, like the layers in an onion (see figure 3). An interesting type is formed when a layer of mud dries and cracks into the pattern to be seen when a mudhole dries. These cracks may be filled with a different mineral, and the whole assembly is preserved. These are known as "septaria" (see figure 4) and resemble a turtle shell.

Figure 1: "Mineral Eggs"

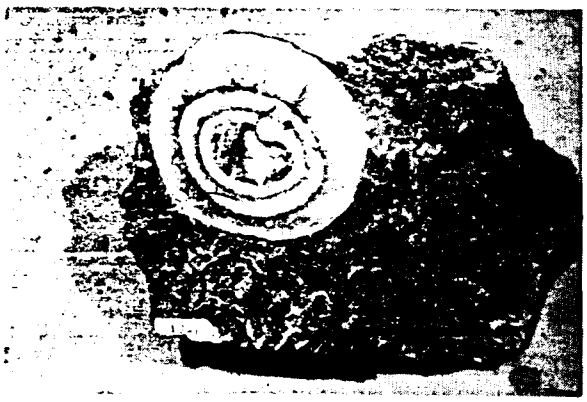


Figure 2: A solid concretion showing rings

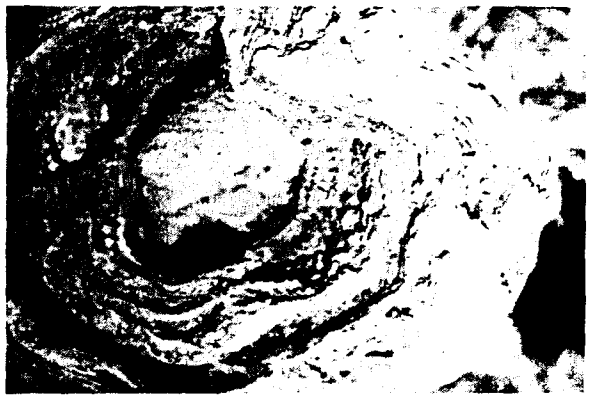


Figure 3: A large hollow concretion with layered wall

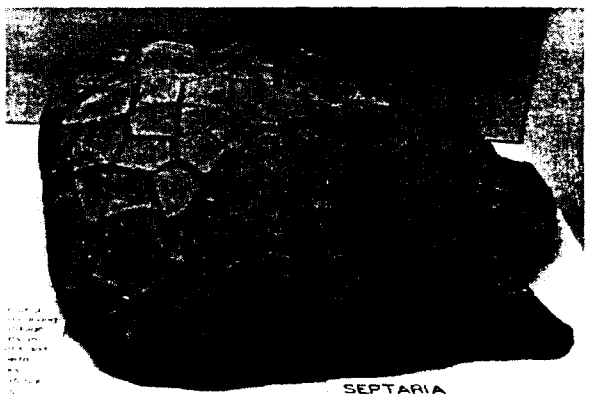


Figure 4: A septaria

## Tri-STATE MINERAL COLLECTING

For about a century the Tri State was an excellent place to collect outstanding specimens of crystallized calcite, galena, sphalerite, marcasite, smithsonite, and hemimorphite, or calamine as it was known until the 1930's. Specimens from different mines and camps showed a variety of colors, crystal habits, and associated minerals. The well-formed crystals resulted from the fact that the minerals in most mines were formed in cavities in which they had plenty of room to grow without interference from their neighbors or from the cavity walls.

Most of the early mining was in these open-ground areas and many fantastic crystals in size and development were found. Museums all over the world display specimens taken from the mines during that period. As large scale mining took over, much of the ore came from "sheet ground" in which the ore minerals formed in small confined places and only occasionally were mineralized cavities found.

With the closing of the mines for economic reasons over 20 years ago, the only source of Tri-State specimens became the minerals taken from the ground many years ago. These sources are rapidly being exhausted. During the active mining period, a miner's dinner bucket was quite likely to be heavier going home than coming to work as exceptional specimes were carried off. Probably there are several tons of such specimens in the area in sheds, garages, attics, and elsewhere, but they are not available. This explains why mineral dealers in this area are not able to supply our local minerals in the quantities that they once could.

## TRIMMING SPECIMENS

Most of us who become interested in rocks, minerals, or fossils wind up collecting at least a few specimens of various ·es. Very often the desired specimen is part of a piece of ,k much too large to fit in a specimen box or on a cabinet shelf. With some practice a large piece of rock can be reduced in size by flaking off pieces of excess rock with a rock hammer. Care must be taken, however, or the desired specimen may be broken or dislodged.

It is possible to use an ordinary machinists vise to remove excess rock with much less chance of damage. The use of auxiliary jaws as shown in the diagram (see figure 5) simplifies the work. The jaws can be made in several ways to satisfy the need for a line contact on the specimen where it is desired to break it, and to keep it from the opposite jaw by a spacer that can be moved to take care of various shaped specimens.

The jaws shown in the diagram are made from 1" x 1/8" strap iron bent to fit the jaws of the vise on which they are used. Holes are drilled and tapped for screws to hold them in place. One jaw is used to keep the vise jaws from being scarred. The other has a short piece of 1" x 1" angle iron brazed to its center. The point of the angle is ground slightly flat and a short piece of drill rod is brazed in place to give it a harder edge.

In use, the specimen is positioned so that the drill rod is at the point where it is desired to break off excess rock. The spacer moves the specimen from the back jaw and gives the specimen room to bend. Often the rock will not break immediately after the vise is tightened and it may be necessary to tighten the vise several times. After a while the rock will ap as it becomes fatigued.

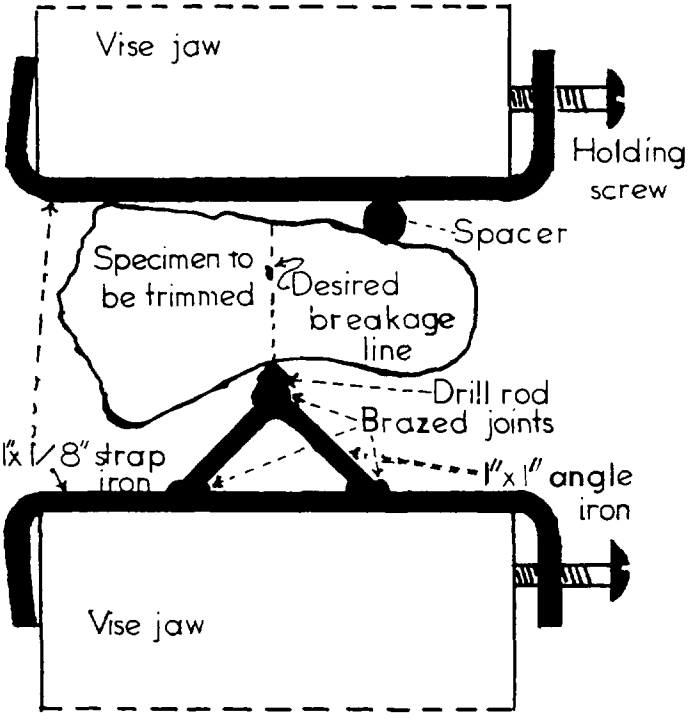



Figure 5: Auxiliary vise jaws for trimming rock specimens

## THE MINERAL MUSEUM BOARD

The Joplin City Council established the Board of Directors for the Tri-State Mineral Museum in 1969 as an advisory board, with the responsibility of advising the Council on Museum matters. The effort was then made to appoint board members with experience and backgrounds in the various aspects of mining and all the associated industries. On its own initative, the Board has carried out many of the functions of an "operating" board.

Each board member has been considered as a unique library of pertinent but unrecorded information about the Tri-State and its activities in many fields. Information of this type is available only from those who lived and worked in the district during the active mining period. These people are now senior citizens and it is not surprising that, of the 20 people who have served on the Board, nine have died in office or very soon after leaving. Each member has made a contribution and it is appropriate to list them here, alphabetically, with their industrial connection and their field of primary interest.

| | | |
|---|---|---|
| Deceased members: | | |
| Chester L. Cook | Joplin Supply Co. | Industrial supplies |
| Mrs Helen Dixon | National Park Service | Park management |
| George W. Fowler | Consulting geologist | |
| Howard O. Gray | Joplin Globe | Mine news editor |
| Jean H. Lemons | Keystone Drills, and Drilling Supply Co, | Exploratory drilling |
| Carl E. McDonald | Mine operator and land developer | |
| Herbert E. Munson | Diesel Supply Co. | Geologist |
| Wm. F. Netzeband | American Zinc Co. | Mine geologist |
| Henry Robinson | National Zinc Co. | Ore buyer |
| Those who resigned, moved away, or did not wish to be reappointed: | | |
| Mrs. Barbara Hicklin | Land titles | |
| Raymon D. Sharp | Mining and mining machinery | |
| Mrs. Chas. Tudor | Metallurgist | |
| Ron Warnkem | IBM Representative | |
| Current Board members: | | |
| Dr. Floyd Belk | Missouri Southern State College | Vice President of Academic Affairs |
| Mrs. June Blalock | Safeway Baking Co. | Computers |
| Harry Butterfield, Jr. | Butterfield's Jewelry | Jeweler |
| Jean F. Eberle | Rogers Iron Works | Mine machinery |
| Al T. Lauener | Rogers Iron Works, and Lauener & Son Machine Shop | Mine machinery manufacture and repair |
| John Mattes | Mattes Brothers Construction Co. | Mining |
| Daniel R. Stewart | American Zinc Co. | Geologist |
| Everett J. Ritchie | Eagle-Picher Industries | Utilization of lead and zinc chemicals and products |
| | | Board Chairman and museum curator |

## MICROMOUNTS

A collection of minerals and rocks can quickly become a bulky and weighty hobby requiring special cabinets or shelves to house the specimens and display them. Many people who would like to make such collections simply do not have enough room. A collection of "micromounts" is an answer that many people have found to be satisfactory. There are other advantages since small crystals are likely to be more nearly perfect than large ones. Specimens can be traded by mail without special shipping problems.

The disadvantage is that the specimens are small and a low-power (5 to 50) binocular microscope is very desirable for viewing the specimens. A good magnifying glass can be used with many specimens.

Figure 6 shows part of the writer's collection, dating from about 1940, and still in good condition. In a box that originally held 8x10 photographic paper there is room for 77 specimens, each in its own box. The little boxes come with black paper lining. The specimens are mounted on small corks that have been painted black and glued to the floor of the box. Figure 7 shows one such specimen of tiny pyrite crystals on a galena crystal from the Weber mine at Treece, Kansas. The box lids carry the identification and both box and its lid are numbered the same.

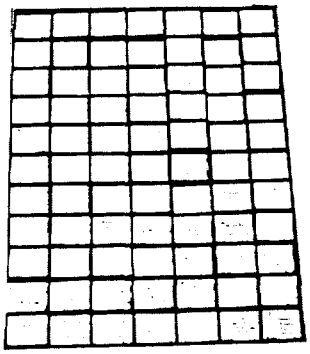


Figure 6: An 8"x 10" box containing 77 mineral and rock specimens

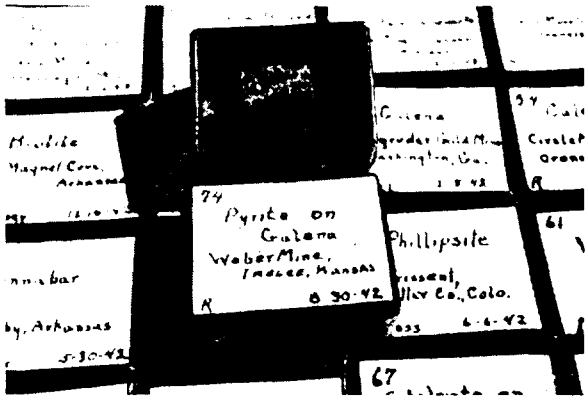



Figure 7: A micromount, "Pyrite on Galena"

## PUBLICATION

For more information about the Museum and the area, the Museum offers "Guidebook to the Tri-State Mineral Museum" by E.J. Ritchie ($5.00 plus $1.00 postage) or "The Introduction" by Mrs. Fred Laas ($1.00 plus $0.25 Postage).

## MUSEUM HOURS

| | |
|---|---|
| Summer | May 1—Sept 30, Mon—Sat 9AM—5PM<br>Sun 1PM—4PM, Closed holidays |
| Winter | Oct 1—Apr 30, Wed—Sat 12PM—4PM,<br>Sun 1PM—4PM, Closed holidays |

Open other times by arrangement

## MINERAL MUSEUM NEWS

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